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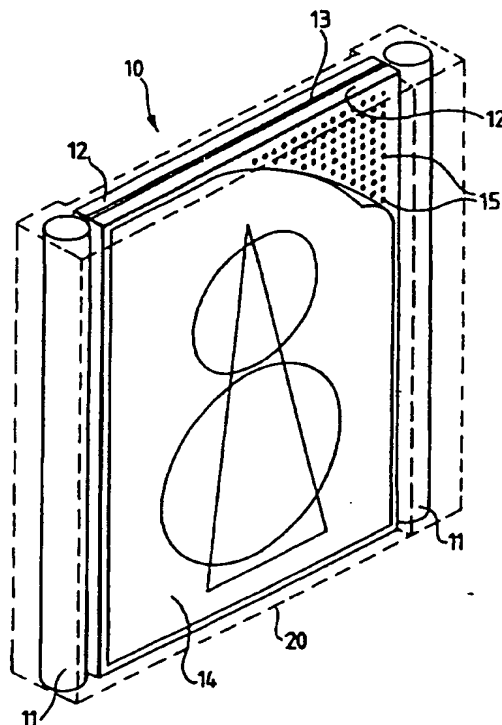
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(21) International Application Number: PCT/GB97/01099 (22) International Filing Date: 21 April 1997 (21.04.97) (30) Priority Data: 9608243.3 20 April 1996 (20.04.96) GB (71) Applicant (for all designated States except US): QUEENS-BURY INTERNATIONAL LIMITED (GB/GB); Fitzherbert Road, Farlington, Portsmouth, Hants PO6 1SE (GB). (72) Inventor; and (75) Inventor/Applicant (for US only): PONSFORD, Malcolm (GB/GB); Queensbury International Limited, Fitzherbert Road, Farlington, Portsmouth, Hants PO6 1SE (GB). (74) Agents: HARRISON, Ivor, Stanley et al.; Wither & Rogers, 4 Dyer's Buildings, Holborn, London EC1N 2JT (GB).		(81) Designated States: AU, BY, CA, CZ, EE, GB, HU, IL, IS, JP, KE, KP, KR, LT, LU, LV, MX, NO, NZ, PL, PT, RU, SG, SK, TR, US, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  Published <i>With international search report.</i>

(54) Title: DISPLAY SIGNS

(57) Abstract

A double-sided edge-lit display sign (10) comprises an opaque core sheet (13) and a sheet (12) formed from a material having a high light transmissivity mounted to each surface of the core sheet (13) and carrying a design applied to the outer surface thereof, in which an array of essentially opaque dots (15) is applied to the outer surface of each light-transmissive sheet (12), beneath the design. Preferably, the dots (15) are white and are painted or screen printed, the density increasing towards the centre of the sheets. Increased surface illumination is achieved for a given light source.



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### Display Signs

This invention relates to illuminated display signs. More particularly the invention relates to edge-lit display signs.

Back-lit illuminated display signs are known, for example for marking the exits of a building, which comprise a panel to which translucent lettering or other indicia has been applied, the sign being substantially box-shaped and enclosing a light source. Illuminated display signs are also known for other purposes such as advertising hoardings, and it is with such signs that the invention is especially concerned. Known illuminated advertising hoardings may be back-lit but may also be edge-lit, in which they are illuminated either from the top, from the bottom or from at least one side edge. Such signs are generally used with translucent display panels and proposals have previously been made for improving the transmission of light from the edge towards the centre of the sign, to provide overall evenness or uniformity of illumination. Such proposals have included the use of arrays of dots or other light diffuser means applied to the surface of a light-conducting panel.

WO 92/05535 discloses an illuminated display system including an edge-lit light transmitting sheet having two opposed surfaces with dots applied to each surface, in which the dots are formed as a matrix of etched, painted or screen-printed dots substantially covering the surfaces. In a one-sided sign, an opaque backing sheet is preferably positioned in contact with one surface of the light-transmitting sheet with the design applied to the other surface over the dots, whereas in a two-sided sign a transparent sheet carrying the design is fixed to

each surface of the light-transmitting sheet. It has been found, however, that the lumination intensity as between the edges and the central region of the system is not as uniform as is desirable and, with a two-sided sign, a ghost image of the sign on the reverse side, especially if formed in a dominant colour or shade, is visible behind the sign viewed from the front side. Where direct sunlight is incident on one side, the image thereon tends to be projected to the other side. If a light diffuser panel is placed between the design and the surface of the sheet, to counteract the colour bleed or image projection, there is a significant reduction in light output.

It is an object of the present invention to provide a double-sided display sign which avoids the disadvantages of known arrangements.

Accordingly, in one aspect the present invention provides a double-sided edge-lit display sign comprising an opaque core sheet, a sheet formed from a material having high light transmissivity being mounted to each surface of the core sheet and carrying a design applied to the outer surface thereof, in which an array of essentially opaque dots is applied to the outer surface of each light-transmissive sheet, beneath the design.

Advantageously, at least two edges of the sign are lit, preferably from opposed edges. That is, two light sources may illuminate the sign respectively from the top and bottom edges or from both side edges. Preferably, fluorescent light tubes are used, although other light sources such as light-emitting fibre optic cables may be used, for example disposed about all edges of the sign.

The array of essentially opaque dots preferably comprises a matrix of dots painted, screen printed or etched onto the surface of the light transmissive sheets. Painted or screen printed dots are, advantageously, white such that they do not affect the colour rendition of the design. The density of the dots preferably increases towards the centre of the sheets, to maintain uniformity of illumination over the entire surface area of the sheets. The density of the dots may be increased either by increasing the size of the individual dots or by decreasing the spaces therebetween. Typically, the dots cover 3% of the surface close to the light source rising to about 12% at the furthest point from the light source. The other surface of the light transmissive sheets are generally of mill finish.

The opaque core sheet is preferably reflective and may be white or another light colour or is coated on its surfaces with such a colour.

Optionally, reflectors may be used behind the or each light source to reflect more light towards the edges of the light transmissive sheets.

The light transmissive sheets and the opaque core sheet are preferably made from a plastics material, for example acrylic sheeting, although the core sheet may be made from a metallic material, especially having a reflective surface.

The design generally comprises one or more translucent posters applied to the outer surfaces of the light-transmissive sheets.

Display signs according to the invention are generally

contained in a housing or casement comprising protective box members at least for the light sources and including reflectors to direct maximum light output or flux density at the edges of the light transmissive sheets while minimising light leakage.

An embodiment of the invention will now be described by way of example with reference to the accompanying drawing which is a partially cut away perspective view of an illuminated display sign edge-lit from the opposed side edges.

With reference to the drawing an illuminated sign, generally indicated 10, includes two fluorescent light tubes 11, two light transmissive acrylic sheets 12, an opaque reflector core 13 made from aluminium and translucent display sheets 14. The housing 20 is shown in broken outline. Dots 15 of opaque white paint are screen printed onto the outer face of each sheet 12. Preferably, the outer faces of the sheets 12 are aligned with the outer edge of the light tubes 11 since such an arrangement maximises the luminosity of the sign for a given light source power. In the embodiment shown, the fluorescent tubes 11 have a diameter of 25 mm and the sheets 12 are 8 mm in thickness.

It has been found that the invention allows approximately a doubling of the illumination at each sign surface for a given light source and avoids the need to apply a light interference pattern to both sides of a central light-transmissive sheet.

CLAIMS

1. A double-sided edge-lit display sign comprising an opaque core sheet and a sheet formed from a material having a high light transmissivity mounted to each surface of the core sheet and carrying a design applied to the outer surface thereof, in which an array of essentially opaque dots is applied to the outer surface of each light-transmissive sheet, beneath the design.

2. A display sign according to claim 1, in which at least two edges of the sign are lit, preferably from opposed edges.

3. A display sign according to claim 1 or claim 2, in which the array of dots comprises a matrix of dots painted, screen printed or etched onto the surface of the light transmissive sheets.

4. A display sign according to claim 3, in which the dots are painted or screen printed and are white in colour.

5. A display sign according to any preceding claim, in which the density of the dots increases towards the centre of the sheets.

6. A display sign according to any preceding claim, in which the dots cover from about 3% of the surface close to the light source rising to about 12% at the furthest point from the light source.

7. A display sign according to any preceding claims, in which the opaque core sheet is reflective.

8. A display sign according to any preceding claim, in which reflectors are positioned behind the or each light source to reflect more light towards the edges of the light transmissive sheets.

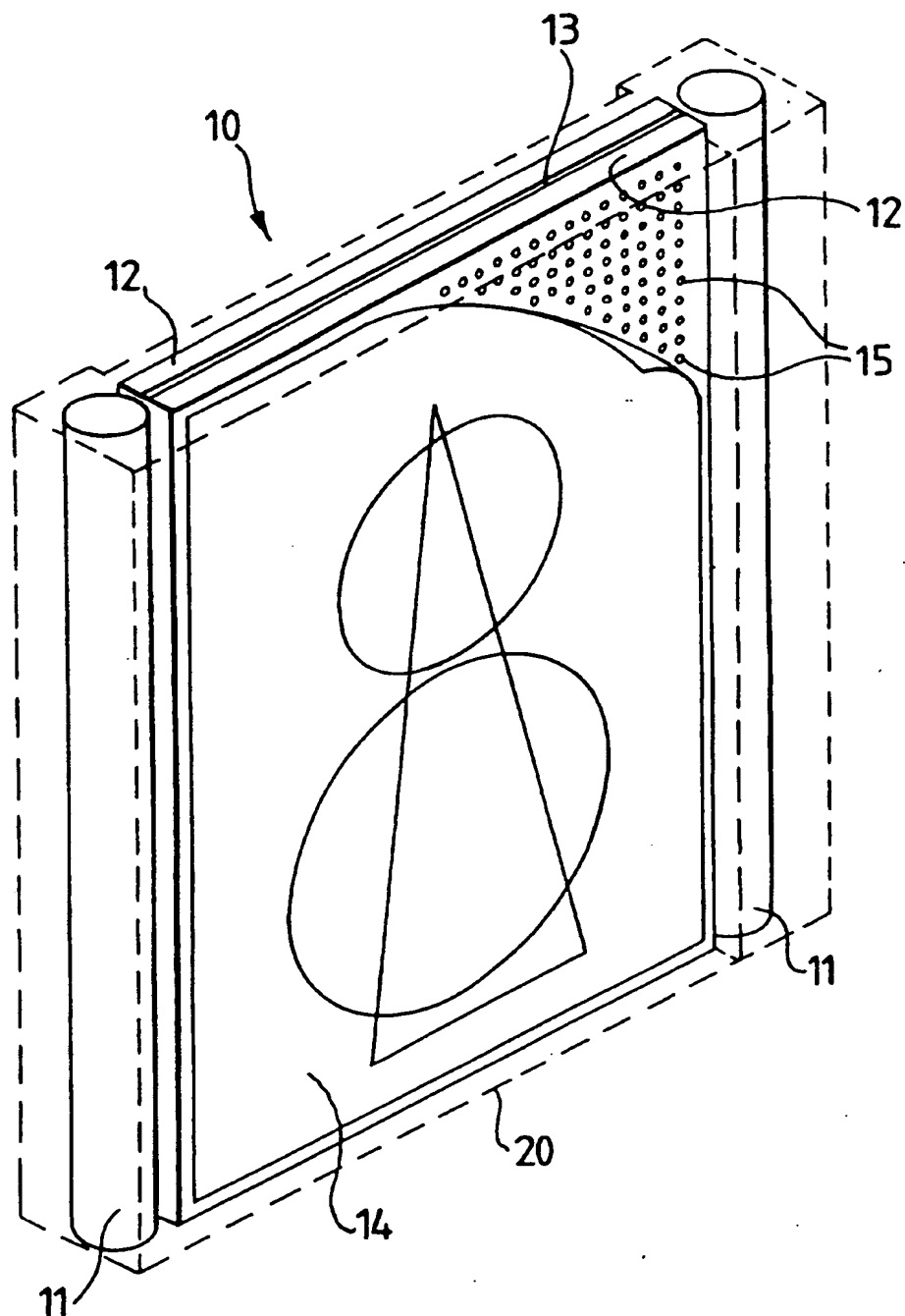
9. A display sign according to any preceding claim<sup>6</sup>, in which the light transmissive sheets and the opaque core sheet are made from a plastics material.

10. A display sign according to any of claims 1 to 8, in which the core sheet is made from a metallic material optionally having a reflective surface.

11. A display sign according to any preceding claim contained in a housing or casement comprising protective box members at least for the light sources and including reflectors to direct maximum light output or flux density at the edges of the light transmissive sheets while minimising light leakage.



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# INTERNATIONAL SEARCH REPORT

International Application No.

PCT/GB 97/01099

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 6 G09F13/18

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 G09F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	GB 402 825 A (ODHAMS PRESS) 11 December 1933 see page 3; figures 5,8	1-11
Y	WO 92 05535 A (ASHLAR SCREENPRINTS) 2 April 1992 cited in the application see the whole document	1-11
Y	EP 0 462 361 A (ENPLAS) 27 December 1991 see abstract; figures 1-15	6,7

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Information on patent family members

Int. National Application No

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